Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Fatality rates

What are your chances of dying if you catch the coronavirus?

Michael Le Page

THE proportion of people who die after being infected by the coronavirus has become a highly controversial subject. Some have claimed that death rates aren't as high as thought and that governments are overreacting by imposing measures such as lockdowns. But a recent meta-analysis confirms earlier estimates, finding that the death rate can be as high as 16 per cent for people over 90, but is 0 per cent for children under 4.

This study concludes that in high-income countries, more than 1 in 100 people infected by the coronavirus died in the first wave. "The death rate is at least 10 or 20 times higher than flu," says Nicholas Brazeau at Imperial College London.

More of the people admitted to hospital with covid-19 are surviving now, suggesting that the death rate has fallen slightly. However, if hospitals in some countries are overwhelmed during the surge of infections now hitting Europe and the US, that might not continue to be the case.

Estimating the real death rate is hard for two reasons. First, the odds of dying from covid-19 vary greatly depending on a person's age, sex, health and the standard of care received. This means death rates will vary from place to place and at different times.

Care home cases

For instance, the death rate is greatest in care homes: as high as 73 per cent in nursing homes in Belgium, one study estimated (medRxiv, doi.org/fjnh). In places such as South Korea that have largely prevented outbreaks in care homes, the overall death rate is lower. Similarly, vaccines that prevent severe disease in older people should reduce death rates.

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A medical worker in an intensive care unit in Cambridge, UK

The second reason it is hard to estimate the real death rate is that there is great uncertainty about the numbers used to calculate it. What we want to know is how many people who get infected with the virus actually die: the infection fatality rate.

The best way to work out how many people have been infected is to test the blood of thousands of people to see how many have antibodies to the coronavirus, and then extrapolate the results to entire countries. But antibody surveys can produce a misleading picture because of false positive and false negative results.

The number of confirmed cases that countries report can't be used to calculate the infection fatality rate because most cases aren't detected – not everyone has symptoms, and not all who do get tested. Estimates suggest that about 250,000 people were infected daily at the peak of the first wave in the UK, when only 5000 daily cases were being reported by the government.

For high-income countries, we do have a fair idea of how many people have died of covid-19 but there are uncertainties. In the UK, for instance, many deaths weren't counted because of an early lack of testing, so the official estimate of about 44,000 in the first wave is too low, says Paul Hunter at the University of East Anglia in the UK.

"The 44,000 number underestimates the total mortality quite substantially," he says. "A lot of deaths were not diagnosed early on." Looking at the number of deaths above what was seen under "normal" conditions in previous years suggests that 10,000 or even 20,000 deaths were missed.

In lower-income countries, most covid-19 deaths are probably unreported. For instance, it is estimated that just 1 per cent of deaths due to covid-19 were reported in Damascus, Syria, according to that country's data.

For all these reasons, reported infection fatality rates have varied. To get a better estimate, Brazeau and his team looked at 175 studies, finding just 10 they regarded as reliable. They adjusted for confounding factors and calculated the death rate for each age group, including 0 per cent for under 4s, less than 0.1 per cent for people

16%

Estimated coronavirus infection fatality rate for people over 90

under 40, 0.36 per cent if 50 to 54, 2.17 if 70 to 74, 5 per cent if 80 to 84 and 16 per cent for those over 90.

During the first wave, the infection fatality rate in high-income countries, which tend to have a high proportion of older people, was just over 1 per cent, the findings suggest. For countries with younger populations, it would have been 0.2 per cent, assuming the same age-specific death rates – which may not be the case given the poorer healthcare in many of these countries.

The death rate should be lower now because healthcare workers have more experience treating covid-19, and trials have revealed which treatments are effective. Figures from hospitals in England, Wales and Northern Ireland show that people admitted with covid-19 after 1 September were about 10 per cent less likely to die than those admitted before then.

"There is evidence that fatality rates in hospital have been improving over time, but more work is needed to fully understand these patterns," says Robert Verity at Imperial College London. Fewer people infected during the current waves in the US and Europe are expected to die, but this won't be clear for a while, because most of the deaths haven't happened yet.